

ATMOSPHERIC COOLING OF SERVERS IN A DATA CENTER

RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 61/800,707, also entitled “Atmospheric Cooling of Servers in a Data Center”, filed on March 15, 2013, and hereby incorporates by reference the disclosure of that application.

BACKGROUND

[0002] The microprocessor and other integrated circuits in a server generate a significant amount of heat which is exhausted from the computer using a computer fan.

[0003] A data center or “server farm” might contain hundreds of servers in racks, resulting in large amounts of heat that could interfere with operation of the servers (e.g., the circuitry on motherboards), if not dissipated.

[0004] For this reason, some organizations that maintain data centers locate them in geographic locations in cooler climes. However, those cooler climes can present problems of their own when environmental temperatures fall to levels that retard the operation of moving parts, such as hard disk drives, in servers.

SUMMARY

[0005] In an example embodiment, an apparatus is described. The apparatus is a building for a data center (or server farm). The building includes a ~~stack~~-chimney structure that interfaces with an environment and one or more housings coupled to a floor and the ~~stack~~-chimney structure. Each of the housings includes one or more racks with a plurality of servers and each of the servers includes a computer fan capable of varying speed or reversing direction. The building also includes ~~one or~~

~~more~~ a plurality of filters between the one or more housings and the environment and a plurality of roll-up ~~one or more~~ walls, wherein each of the roll-up walls is operable to be between one of the ~~one or more~~ filters and the environment, and wherein the apparatus does not include a mixing chamber.

[0006] In another example embodiment, an apparatus is described. The apparatus is a building for a data center (or server farm). The building includes an attic coupled to a floor. The attic includes a chimney stack structure that interfaces with an environment. The building also includes one or more housings coupled to the floor. The attic includes a bottom surface that is coupled to the one or more housings. Each of the housings includes one or more racks with a plurality of servers and each of the servers includes a computer fan capable of varying speed or reversing direction. The building also includes ~~one or more~~ a plurality of filters between the one or more housings and the environment and ~~one or more~~ a plurality of walls, wherein each of the walls includes one or more louvers and is operable to be between one of the ~~one or more~~ filters and the environment and wherein the apparatus does not include a mixing chamber.

[0007] Another example embodiment also involves a method. According to the method, a geographic location is ascertained where the rate of environmental temperature change per time interval is relatively small. Then a building is erected at the ascertained geographic location. The building includes a chimney stack structure that interfaces with an environment and one or more housings coupled to a floor and the chimney stack structure. Each of the housings includes one or more racks with a plurality of servers and each of the servers includes a computer fan capable of varying speed or reversing direction. The building also includes ~~one or more~~ a plurality of filters between the one or more housings and the environment and ~~one or more~~ a plurality of roll-up walls, wherein each roll-up wall is operable to be between one of the ~~one or more~~ filters and the environment and wherein the building does not include a mixing chamber.

CLAIMS

1. An apparatus, comprising:

a ~~stack~~ chimney structure that interfaces with an environment;
one or more of housings coupled to a floor and the ~~stack~~ chimney structure, wherein each of the housings includes one or more racks with a plurality of servers and wherein each of the servers includes a computer fan capable of varying speed or reversing direction;
~~one or more~~ a plurality of filters between the one or more housings and the environment; and
~~one or more walls~~ a plurality of roll-up walls, wherein each of the roll-up walls is operable to be between one of the ~~one or more~~ filters and the environment, and wherein the apparatus does not include a mixing chamber.

2. An apparatus as in claim 1, wherein ~~at least one of the walls is a roll-up wall~~ each filter is a mesh filter.

3. An apparatus as in claim 2 1, further comprising a controller that rolls down or rolls up the roll-up wall depending at least in part on a temperature measurement of the air proximate to the servers.

4. An apparatus as in claim 3, wherein the temperature measurement determines whether a rate of change in temperature has occurred that exceeds an allowable rate of change in temperature determined by ~~the~~ a manufacturer of the server.

5. An apparatus as in claim 4, wherein the allowable rate of change in temperature is approximately a drop of nine degrees Fahrenheit within approximately one hour.

6. An apparatus as in claim 1, wherein ~~at least one of the walls includes one or more louvers~~ the chimney structure includes a damper.

7. An apparatus as in claim 6, further comprising a controller that opens or closes the ~~one or more louvers~~ damper depending at least in part on a temperature measurement of the air proximate to the servers.

8. An apparatus as in claim 7, wherein the temperature measurement determines whether a rate of change in temperature has occurred that exceeds an allowable rate of change in temperature determined by ~~the~~ a manufacturer of the server.

9. An apparatus as in claim 8, wherein the allowable rate of change in temperature is a drop of approximately nine degrees Fahrenheit within approximately one hour.

10. An apparatus as in claim 1, further comprising a fan in the chimney structure that pushes or pulls air into the ~~stack~~ chimney structure.

11. An apparatus as in claim 10, further comprising a controller that controls the fan depending at least in part on a temperature measurement of the air proximate to the servers.

12. An apparatus as in claim 11, wherein the temperature measurement determines whether a rate of change in temperature has occurred that exceeds an allowable rate of change in temperature determined by ~~the~~ a manufacturer of the server.

13. An apparatus as in claim 12, wherein the allowable rate of change in temperature is a drop of approximately nine degrees Fahrenheit within approximately one hour.

14. An apparatus as in claim 1, wherein the ~~stack~~ chimney structure includes components or materials that warm air passing through the ~~stack~~ chimney structure.

15. An apparatus, comprising:

an attic coupled to a floor, wherein the attic includes a ~~stack~~ chimney structure that interfaces with an environment;

one or more housings coupled to the floor, wherein each of the housings includes one or more racks with a plurality of servers and wherein each of the servers includes a computer fan capable of varying speed or reversing direction;

~~one or more~~ a plurality of filters between the one or more housings and the environment;

~~one or more walls~~ a plurality of walls, wherein each of the walls includes one or more louvers and is operable to be between one of the ~~one or more~~ filters and the environment, and wherein the apparatus does not include a mixing chamber; and
a controller.

16. An apparatus as in claim 15, wherein the attic includes a bottom surface that is coupled to the one or more housings.

17. An apparatus as in claim 15, wherein ~~at least one~~ each of the walls ~~includes one or more louvers~~ is manually operated.

18. An apparatus as in claim ~~17~~ 15, wherein the controller opens or closes the one or more louvers depending at least in part on a temperature measurement of the air proximate to the servers.

19. An apparatus as in claim 18, wherein the temperature measurement determines whether a rate of change in temperature has occurred that exceeds an allowable rate of change in temperature determined by ~~the~~ a manufacturer of the server.

20. A method, comprising:

ascertaining a geographic location where the rate of environmental temperature change per time interval is relatively small compared to other geographic locations; and

erecting a building at the ascertained geographic location, wherein the building comprises:

a ~~stack~~ chimney structure that interfaces with an environment;

one or more housings coupled to a floor and the ~~stack~~ chimney structure, wherein each of the housings includes one or more racks with a plurality of servers and wherein each of the servers includes a computer fan capable of varying speed or reversing direction;

~~one or more~~ a plurality of filters between the one or more housings and the environment; and

~~one or more walls~~ a plurality of roll-up walls, wherein each of the roll-up walls is operable to be between one of the one or more filters and the environment, and wherein the building does not include a mixing chamber.